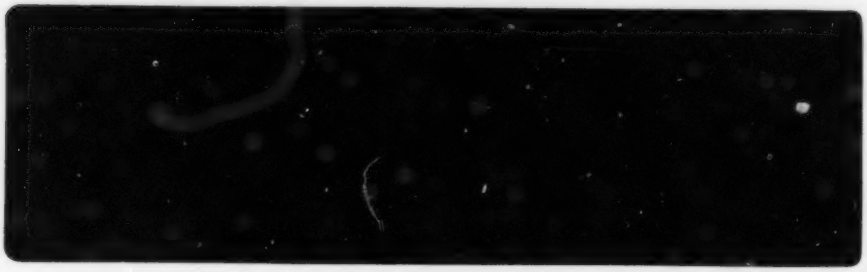
CANMET

Canada Centre for Mineral and Energy Technology

Centre canadien de la technologie des minéraux et de l'énergie



Energy, Mines and Resources Canada

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THE ENERGY OF OUR RESOURCES · THE POWER OF OUR IDEAS

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NORMATIVE STANDARDS IN CANADA:

IMPLICATIONS FOR CANMET

Research Program Office — RPO
Policy, Planning and Services Branch — PP&S
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FOREWORD

This study was prepared by the Research Program Office (RPO) of CANMET with the assistance of the Standards Council of Canada (SCC), the Canadian General Standards Board (CGSB), the National Research Council (NRC) and the following operating units of CANMET:

*	Coal Research Laboratories	CRL
*	Efficiency and Alternative Energy Branch	EAETB
*	Energy Research Laboratories	ERL
*	Explosives Division	ED
*	Metals Technology Laboratories	MTL
*	Mineral Sciences Laboratories	MSL
*	Mining Research Laboratories	MRL

Normative Standards in Canada: Implications For CANMET

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I-INTRODUCTION

This study attempts to respond to the following questions posed by Dr. M.D. Everell, Assistant Deputy Minister, Mineral and Energy Technology Sector (METS) of the Department of Energy, Mines and Resources (EMR).

1. Who is responsible for setting standards policy in Canada?

2. Is CANMET getting adequate guidance from those responsible for policy formation?

3. What is CANMET's responsibility in standards policy formation?

4. What organization is responsible for the implementation of standards policy?

5. What is CANMET's responsibility in the implementation of standards policy?

6. How does CANMET's investment of resources in the standards area match its mandate? Should we withdraw some resources?

7. How are CANMET's clients participating in the standards process?

8. How are standards managed in CANMET? How do we influence policy formation?

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II-EXECUTIVE SUMMARY

In response to Dr. Everell's questions, this study concluded:

1. The government of Canada sets standards policy and has it implemented through the National Standards System (NSS) that is managed by the Standards Council of Canada (SCC).

2. CANMET has adequate access to the direction it requires.

3. CANMET participates in the development of standards policy in its own interests.

4. The Standards Council of Canada (SCC) is responsible for the implementation of standards policy within the NSS.

5. CANMET must abide by decisions derived within the NSS.

6. Participation by CANMET on standards committees of the NSS supports CANMET's technology transfer strategy.

7. Standards committees are staffed by a diverse cross section of volunteers from CANMET's client base.

8. Standards are managed within each CANMET division as a routine element of the technology development process.

Other major conclusions were:

* This study deals with normative standards, not with physical standards.

* Within the NSS, the greatest number of standards are written by the CGSB (54 percent) and the CSA (35 percent). CANMET officials are active, as volunteers, on both CGSB and CSA committees.

* The influence of the CGSB on standards development within the federal government should increase.

* All departments of the government of Canada are involved in one way or another in standards.

* CANMET commits approximately 16 PYs (two percent of its total staff: half in revenue generation) to standards-related work at a total annual cost of up to $2,000K.

The major recommendations were:

1. Even in the absence of revenue-generation, CANMET should continue to dedicate about one-percent of its resources to activities related to technology transfer.

2. CANMET should continue to dedicate resources to revenue generating activities--at full cost recovery. One-percent of resources are currently committed in this area.

3. CANMET should restrict its involvement in the international arena to those activities financially supported by the SCC--unless it is in CANMET's direct interest to finance its own participation.

4. Senior management might wish to reevaluate the scope of CANMET involvement. Some CANMET resources appear to be spread very thinly. Moreover, costs may be higher than suggested within this report.

5. CANMET should open negotiations with the SCC to determine if or how CANMET's various laboratories should apply for official certification status within the NSS. This applies particularly to the newly defined "Registration" status which deals with the quality of our management systems. In other words, assessing TQM at CANMET.

6. CANMET should open separate negotiations with the CGSB to determine if or how the evolving CGSB mandate will affect CANMET's freedom of action in standards-related work.

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III-BACKGROUND

Standards can be physical or normative. In either case, they are criteria established by accepted authorities for use as objective references. In this study we are concerned with normative standards. Refer to Appendix I for information on physical standards.

Normative standards are defined by the Standards Council of Canada (SCC) as norms required to solve problems. These norms are specified by a recognized authority and concern performance criteria and processes.

The development of, and compliance with, these standards are generally voluntary and by consensus. Moreover, standards are developed as a result of needs identified in the private or public sectors. The needs derive from commercial or policy imperatives.

In the public sector, United Nations decisions on the transport of dangerous goods, for example, have promoted development of related standards in Canada. Moreover, government laboratories look to the development and promotion of standards as an important means of commercializing the results of their research. Private sector representatives are active on standards-writing committees. As a result, commercial and public interests are promoted concurrently.

Although the development of these standards may be initiated by any interested parties, and may be written by any individuals or associations, they are normally written by accredited Standards-Writing Organizations (SWO) of the National Standards Systems (NSS). Standards are developed and written for specific customers (usually but not necessarily by an SWO) for use within their own limited spheres of influence. National standards, on the other hand, are more global in application and, hence, must be developed and written by an accredited SWO. There were 1,631 National Standards in Canada in 1990/91 as well as many more standards that did not qualify as National Standards.

The NSS is an affiliation of independent organizations engaged in standardization activities. These activities are: (1) Standards writing, (2) Testing, (3) Certification, (4) Registration, and (4) Participation in international standards organizations such as ISO and IEC, where the SCC attempts to harmonize Canadian standards with international imperatives.

Registration (of a supplier's quality system), the most recent of SCC functions was announced in April 1992. It involves the assessment of an organization's management systems to ensure that "registered supplier is capable of supplying products or services that meet the specified requirements." This approach is common in the Japanese auto industry. Its offshoot is sometimes called Total Quality Management (TQM). In simple terms it means that not only must a supplier supply a product that satisfies a consumer's specification, the supplier must have management systems in place that assure the consumer that the specified product will always be supplied at the time, price and place specified. This is a relatively new but growing phenomenon in industrialized countries. As of April 23, 1992 the SCC had not accredited any organizations or companies to carry out this function.

The SCC manages the NSS. This includes the accreditation of organizations for standards writing, testing, certification and registration. The SCC is a crown corporation established by an act of Parliament in 1970. It reports to Parliament through the Minister of Consumer and Corporate Affairs. See Appendix II for a summary of SCC objectives and powers.

The accredited SWOs are listed below. The subject areas allocated by the SCC to each of these organizations for the development of National Standards are described in SCC publication CAN-P-1013.

- Le Bureau de Normalisation du Québec (BNQ)
- The Canadian Gas Association (CGA)
- The Canadian General Standards Board (CGSB)
- The Canadian Standards Association (CSA)
- The Underwriters Laboratories of Canada (ULC)

By far the greatest number of standards are written by the CGSB (54%) and the CSA (35%). Supporting the SWOs in 1990/91 were 14,381 volunteer experts on 1,626 committees. They represented the three levels of government, universities, industry, associations and consumers. CANMET officials are active in the CGSB, the CSA and related organizations. See Appendix III for details on the standards-writing process.

There are many testing organizations. They test products or services against specified standards and submit their findings to whomever requested the test. They include organizations as diverse as ORTECH, Northern Telecom, le CEGEP de Sainte-Hyacinthe and the CSA.

On the other hand, there are relatively few certification organizations accredited by the SCC. They are:

- Canadian Gas Association (CGA)
- Canadian General Standards Board (CGSB)
- Canadian Standards Association (CSA)
- Council of Forest Industries (CFI)
- Underwriters Laboratories of Canada (ULC)
- Warnock Hersey Professional Services

However, there are certification organizations (not accredited by the SCC) whose authority is nevertheless accepted by other interested parties, and hence unofficially by the SCC. Some of CANMET's laboratories fall into this category. CANMET's Metals Technology Laboratories (MTL), for instance, are recognized by industry and government as the sole location for the certification of Non-Destructive Testing (NDT) personnel to CGSB standards. Other, foreign or employer-based, organizations in Canada also provide related NDT certification services. They are, however, not as universally accepted as the EMR-CGSB system administered by MTL. Similarly, the Canadian Welding Bureau operates a program for certifying welding inspectors that is also outside the official ambit of the SCC, but which is generally accepted by industry. The need for these non-SCC accreditation programs derives from the fact that the SCC has no certification programs where individuals (as opposed to equipment, facilities or processes) are certified against particular standards.

CANMET's Canadian Explosives Atmospheres Laboratory (CEAL) at the Mining Research Laboratories (MRL) is in much the same position. Although CEAL is not accredited by the SCC, its certification authority is nevertheless recognized in specific areas. This includes explosives atmospheres where CEAL's authority derives from an Order in Council (OIC). In other related but non-legislated areas, industry and government, in Canada and abroad, have so far accepted CEAL's certification decisions. This includes the certification of equipment such as electrical and diesel equipment, conveyor belts and hydraulic fluids. In addition, MRL's Explosives Research Laboratory operates under the authority of the Canada Explosives Act. Provincial Mines Inspectors accept CANMET's accreditation decisions in these areas; so also does the US Coast Guard for flame arrestors.

This de facto recognition of CANMET's authority could change as the evolving requirements of international trade impose more formal requirements. As a result, CANMET's labs may be required to submit their certification test results to other organizations officially authorized to provide SCC

certification. (NDT personnel certification may be an exception.) Alternatively, CANMET's labs could individually apply for SCC accreditation within the NSS. To become an accredited member of the NSS, the lab in question must apply to SCC and meet its criteria for accreditation. The process could take up to two years. CEAL is preparing an application to the SCC for accreditation.

IV-INVOLVEMENT OF FEDERAL GOVERNMENT

National Research Council

All departments of the government of Canada are involved in standards, in one way or another. For example, the NRC is involved in physical standards through the Institute for National Measurement Standards (INMS). This involvement is mandated by legislation or Order-in-Council. See Appendix I for detail on the involvement of the NRC in standards.

External Affairs

The Department of External Affairs chairs an ad hoc committee called the Interdepartmental Committee on Standards Policy (ICSP). This committee is concerned with the effects of normative standards on international trade. When a trade issue of interest to Canada arises, a committee meeting is called, representatives invited from concerned departments, and the particular issue discussed. The issue is then taken back to departments concerned for information or resolution. EMR has a representative from the Mineral Policy Sector on the ICSP.

Privatization and Regulatory Affairs

The now disbanded Office of Privatization and Regulatory Affairs (OPRA) conducted a study of the NSS in 1989. OPRA concluded that there may be a breakdown in communication between the NSS and government regulators. Some are of the view that this is the consequence of unavoidable tension between regulators and the regulated. Others, especially government officials, feel that narrow private sector interests are not compatible with broader government interests. As a result, OPRA recommended:

1. that an interdepartmental task force be established and charged with developing a "Standards Policy for the 1990s" for Cabinet consideration;

2. that the task force be headed by Industry, Science and Technology Canada (ISTC) and include representatives of the departments concerned;

3. that the proposed new federal policy on standards bring about reforms related to issues such as:

   (a) How should the government view and organize to address standards issues?

(b) What role should the SCC play in the NSS?

(c) What is the appropriate role for the NSS within the federal regulatory environment?

Although the task force was struck and did consider the problems cited above, its recommendations were not favourably received within the departments concerned. Within EMR they were rejected by Corporate Policy and Communications. Consequently, no policy on standards has been sent to Cabinet. And, until some department compensates for the disappearance of OPRA, none will.

Canadian General Standards Board

As mentioned earlier, the CGSB (Supply and Services Canada) writes the largest share (54 percent) of NSS standards in Canada. With its acquisition of Special Operating Agency (SOA) status (April 1, 1992), the influence of the CGSB on standards development within the federal government should increase. As a result, it may very well adopt a more aggressive stance on standards writing, accreditation and certification within government. This could influence CANMET's options in this area.

Energy, Mines and Resources

EMR currently funds standards development work in Non-destructive testing (NDT), Marine anti-exposure suits, Geomatics, Interior Sealants and weatherstripping, Insulating glass units, and Glass and glazing. The funds for NDT (about $30K annually) are provided by MTL from the fees obtained from its NDT clients. In the recent past, EMR has also supported standards development in Thermography, Residential insulation contractors, Air sealing, Aerosol urethane insulation sealants, and Indoor air quality.

Moreover, there were 65 EMR representatives on CGSB SWO committees in 1990/91: 21 from SMRS, 3 from GSC and 41 from the rest of EMR, the majority from CANMET. CANMET's effort in standards development is one of eleven research projects under study by Brystra Consultants, a firm commissioned to do a cost-benefit analysis of selected CANMET projects. COGLA was also active in standards-relate work before its dissolution, at which time its functions were absorbed by other EMR Sectors or within other departments of the federal government.

EMR also has representatives on committees of other SWOs, especially the CSA. Some also work with international standards organizations. Since most of the standards work in

CANMET is conducted within its operating units, the following summarizes related activity in each major operating unit of CANMET.

Coal Research Laboratories

CRL has little involvement in standards development. However, its staff is called upon occasionally to provide expert advice to those involved in standards development. But, CRL is reactive rather than proactive.

Efficiency and Alternative Energy Branch

EAETB spends approximately $194K and 0.8 PYs annually on standards, an annual total of about $275K. No related revenue is generated.

EAETB views its activity in standards as a key element in the development of a solid technical and industrial infrastructure that is required to transfer technology to the market. In addition to supporting energy-related objectives, these activities also address health and safety issues. The new Federal Energy Efficiency and Alternative Energy Act will support EAETB involvement in standards. In the Energy Efficiency Division of EAETB standards are also a key component of overall technology transfer strategy. For instance, new products and techniques will not be adopted by industry and until their use is covered in a standard.

The practical use of standards is ensured by seeking broad consensus approval within the Canadian standards development process. EAETB also promotes the harmonization of standards between Canada and United States to ensure that the U.S. market is open to Canadian manufacturers. Finally, standards also assist in the exchange of technical information as well as to advance product performance.

As mentioned previously, EAETB spends $194,000 and 0.8 PYs annually on standards, less than one percent of its total annual budget. This is very little considering the benefits obtained from our normal client base in industry. Furthermore, we influence industry by convincing standards committees to include more energy efficient technologies in new standards. EAETB's standards work is very cost efficient and fits well within our technology transfer strategy.

Question 6: How does CANMET's investment of resources in the standards area match its mandate? Should we withdraw some resources?

EAETB participation on standards committees supports the commercialization of CANMET technologies. Manufacturers and consumers regularly adopt new technologies or products through standards. It is, therefore, very important to be closely associated with standards development committees.

Standards are a necessary part of the technology transfer process; they are especially useful overcoming market barriers. These barriers are regulatory-related for energy efficiency technologies; for example, ventilation standards, where the national and provincial building codes govern how buildings are built; and residential gas equipment where provincial combustion safety departments govern. Similarly for bioenergy technologies, standards for the efficiency and safety of solid-fuel burning appliances address regulatory barriers.

Standards are also used by both efficiency and alternative energy technologies as a means of demonstrating compliance to minimum performance levels. In this case the standards are published and then manufacturers have their products tested and, sometimes, certified. The manufacturer is then able to promote his compliance with the standard.

Our involvement in CSA standards for the performance of electrical products arises from the need to play a technical support role to the EMR EnerGuide appliance labelling program. Similarly our involvement with CGSB standards for fuels also performs a monitoring and technical support role.

On international standards committees we negotiate for the recognition and acceptance of Canadian technology in the standards development process so that international standards will not become a technical barrier to trade. This is important in the face of GATT, Europe 1992 and the Canada-US Free Trade Agreement.

Question 7: How are CANMET's clients participating in the standards process?

Standards committees are usually composed of people from a diverse cross section of industry, government, utilities, consultants, testing agencies and others. They are all part of EAETB's client base.

Question 8: **How are standards managed in CANMET? How do we influence policy formation?**

Standards are managed by each division within EAETB. It is left to each chief to decide how much work his/her group should do in the standards area. The decision is usually directly linked to the place that standards-related work occupies in his/her particular technology transfer strategy.

EAETB is unique within CANMET in that it has a sister branch in the energy sector that is specifically mandated to handle policy work in the efficiency and alternative energy field. Since both branches work fairly closely together, EAETB influences policy formation by interacting with its sister branch.

Appendix IV lists the standards committees on which EAETB personnel are active.

Energy Research Laboratories

ERL expends approximately 3 Percent of its 160 PYs on standards-related work in order to generate 15 percent of its cost-recovery revenue and realize 30 percent of its task shared work with its industrial clients.

Question 1: **Who is responsible for setting standards policy in Canada?**

The government of Canada sets standards policy in Canada. The policy with respect to normative standards is implemented and managed by the Standards Council of Canada (SCC).

Question 2: **Is CANMET getting adequate guidance from those responsible for policy formulation?**

Despite sound coordination at the R&D working level, the role standards policy plays in technology development is not well communicated by the SCC to CANMET management.

Question 6: **How does CANMET's investment of resources in the standards area match its mandate? Should we withdraw some resources?**

Mandated standards services would include activities involving certification. Within ERL certification testing is primarily limited to residential, commercial and biomass heating. These activities consume approximately 0.9 PYs. They have generated revenue averaging $30K annually over the past three years. In

addition a significant level of task-shared work on testing of equipment and products for certification is conducted with industrial agencies and individual private sector clients.

Non-mandated standards activities fall into the category of referee analysis, quality assurance and development of specialized testing services, and new methodology. Within ERL these activities consume approximately 3.6 PYs. They have generated an average of $200K per year. The bulk of the cost recovery effort involves coke oven tests conducted within CCRL and referee analysis by FCRL.

Joint standards studies in the area of non-mandated work account for nearly $1M of the divisional task-shared projects with industry. The bulk of these projects involve experimental studies conducted in collaboration with standards writing organizations and industry. Mutual acceptance of tests, specifications and regulations based on the results of these studies promotes stability in the marketplace and protects Canada's standard of living while fostering orderly transition to new technologies and new sources of oil supply.

In ERL standards activities continue to contribute effectively to divisional performance targets.

Question 7: **How are CANMET's clients participating in the standards process?**

Until recently government agencies and SWOs functioned in an adversarial atmosphere. The policy makers of government often claimed that consensus standards set by volunteer SWOs were the "lowest common denominator" while the volunteer SWOs claimed that unilateral standards enforced by governments lacked the technical depth characteristic of those developed through the consensus approach.

However, in a time of bilateral and multilateral trade agreements, unification of standards within the regional economic communities such as the EEC and international reaction on environmental issues, government, industry and the ultimate consumer are working cooperatively in setting standards policy.

As to the question of implementation, ERL's clients are actively involved in the deliberations of the working committees of the CGSB, as well as the Canadian Advisory committees to the SCC. ERL participates only in those SCC affiliate groups and advisory committees (as well as the ASTM and ISO counterparts) that are dominated by industry.

Question 8: **How are standards managed in CANMET? How do we influence policy formulation?**

In ERL standards are treated as an integral component of the technology development process. Care is taken to ensure that regulations are encouraged that promote commercialization and minimize environmental risk. Consequently, it seems clear that CANMET's best opportunity to influence standards policy is to work collaboratively with government agencies and SWOs that set standards policy. Indeed ERL is and has been represented on both the technical and management executive levels of SWOs as well as on the SCC, ASTM and ISO.

ERL is/has been represented in the following standards organizations:

* International Organization for Standardization (7 committees)
* American Society of Mechanical Engineers (3 committees)
* Wood Heating Alliance (2 committees)
* ASTM (14 committees)
* CGSB (7 committees)
* Canadian Gas Association (4 committees)
* Canadian Standards Association (14 committees)

Explosives Division

The Explosives Division has few standards-related responsibilities. Schedule I of the Regulations gives some rather loose standards for packaging explosives for shipment. With the exception of a few details, the standards basically say that packaging must be such as to not allow spillage. Maximum quantities per package are listed.

Schedule III gives safety specifications for the electrical, brake, fuel and exhaust systems of trucks that are to be allowed to carry a full load of explosives. Schedule IV gives the construction details of a container suitable for carrying detonators on the same vehicle as explosives.

Outside the regulations, we have standards for construction of magazines. We are attempting, with some difficulty, to establish standards for fireworks. At some future time, we shall probably attempt to develop standards for detonators.

Question 6: **How does CANMET's investment of resources in the standards area match its mandate? Should we withdraw some resources?**

The Explosives Division spends few resources on standard setting. Those we do spend are only those necessary for our mandate. We should not reduce our effort, but there is no urgency to increase it.

Question 7: **How are CANMET's clients participating in the standards process?**

Members of the fireworks industry and the American Pyrotechnics Society are being consulted in the development of fireworks standards, the only current standards-generating exercise. Also, through the International Group of Experts on Unstable Substances and the International Pyrotechnics members of the Explosives Division and of CANMET's Canadian Explosives Research Laboratory are keeping in touch with attempts to set a European standard within the EEC.

Question 8: **How are standards managed in CANMET? How do we influence policy formulation?**

The Explosives Division makes policy as and when required.

Metals Technology Laboratories

MTL spends about $575K (8 PYs) annually on standards-related work, of which $500K and 7 PYs are dedicated to NDT certification testing. The NDT program generates average annual revenue in excess of $600K. MTL transfers about $30K of this NDT revenue to the CGSB to fund related work. There are occasional one-time cost recovery opportunities ($30K in 1991 from the Canadian Petroleum Association to test the performance of pipeline steels in sour environments).

MTL's work on Canadian standards development has primarily been through various CSA and CGSB committees. In particular, MTL staff have been active on the CSA committees that prepare standards for various types and strengths of steel, including G40.20/21, Welded Structural Quality Steels; G30.12/16, Reinforcing Materials for Concrete, and the W48 Series, Welding Consumables.

Staff are members of the CSA committees that recently prepared a series of standards on the design and construction of offshore structures (S473, Steel Offshore Structures). The preliminary standards incorporated the results of fatigue and

fracture research performed or funded by MTL, and thus are based on data relevant to the specific conditions of the Canadian offshore areas of interest for hydrocarbon production. In addition to the S473 Standard, MTL research and expertise was used in developing the Offshore Supplement to existing CSA welding standards, W59 and W47.1.

MTL staff are members of the CSA committee that prepares the standards governing the design, construction and inspection of gas and oil transmission pipelines, another area where MTL's research results have been incorporated in standards. MTL is represented on the Fracture Toughness Task Force of the pipeline standards technical committees. This group makes recommendations on toughness requirements that impact directly on the safety of the Canadian pipeline systems. Pipeline activities fall within the CSA Committees: Z183, Oil Pipeline Systems; Z245, Steel Line Pipe; and Z184, Gas Pipeline Systems.

MTL's main interaction with the CGSB is in the area of the certification of personnel for competence in Non Destructive Testing (NDT). MTL operates the NDT program, ensuring that individuals involved in NDT meet the requirement of various CGSB Standards (48-GP-4M/7M/8M/9M/13M). MTL, working through a series of test centres across Canada, examines the qualifications of individuals, prepares and marks exams, and, for the successful candidates, issues certificates indicating that the candidate meets the requirement of a particular CGSB standard. This program is self financing in that the fees collected from the candidates cover the cost of the program, including overhead. MTL staff sit on the CGSB committees that prepare the standards on NDT Personnel Certification, and MTL helps to fund this CGSB activity through the transfer of funds ($30K in FY 91/92) from the revenue of the NDT certification program to CGSB. NDT personnel are involved in all segments of Canadian industry, from automobile and aircraft manufacture to heavy equipment and nuclear plant inspection.

MTL scientists and engineers are members of international technical organizations, such as the American Society for Testing and Materials, National Association of Corrosion Engineers, American Foundrymen's Society, and the International Institute of Welding (that prepares ISO Welding Standards), that prepare standards that are widely used in Canada and around the world. Results of MTL's research have been incorporated in the standards of these organizations, or used to validate procedures specified in the standards.

In addition to work with the normal standards organizations, MTL provides expertise to other government departments on

standards-related matters. For example, MTL has worked with the Canadian Coast Guard (CCG) of Transport Canada (TC) to obtain data on the fracture of ship plate at low temperatures, data that TC uses in the formulation of the Canadian Arctic Shipping Pollution Prevention regulations. MTL scientists provide advice to CCG on an ongoing basis regarding steel performance in Arctic vessels; they also participate in failure and marine casualty analyses.

Participation in these standards and related committees is a highly effective method of technology transfer from MTL to Canadian Industry. Through these activities, MTL maintains contact with a diversified group of Canadian (and foreign) technical experts, all having a common goal: the preparation of up-to-date standards to facilitate public safety, trade and industrial development.

MTL is/has been represented on the following standards organizations:

* Canadian Standards Association (several committees)
* International Organization for Standardization (2 committees)
* International Institute of Welding (2 committees)
* ASTM (3 committees)
* National Association of Corrosion Engineers (6 committees)
* CGSB (2 committees)

Mineral Sciences Laboratories

MSL expends 1.3 PYs annually on standards-related work, an annual total of about $100K.

MSL effort in the past, and to a lesser extent on an on-going basis, is directed towards participation in the technical working committees or in Canadian advisory committees of the International Organization for Standardization (ISO), the American Society for the Testing of Materials (ASTM), and the SCC for the purposes of:

- developing measurement technology in analytical chemistry and properties of concrete;
- evaluation of existing measurement technology in analytical chemistry and properties of concrete;
- developing concepts and principles for generic

applications such as statistical, certification and accreditation procedures;

- holding offices in these committees to ensure the continuity of the process. (Participation in international level committees has been halted beginning in 1992/93.); and

- certifying and distribution for sale reference materials (Both mineralogical and concrete) to assist in quality control of analytical laboratories and the assessment of the accuracy and precision of existing and new methods.

In 1991/92, MSL participated in ISO/TC 17 (Steel), 26 (Copper and Copper Alloys), 102 (Iron Ores), 183 (Copper, Lead and Zinc Ores and Concentrates), 69 (Application of Statistical Methods) in collaboration with 21 private sector companies and organizations. There will be a significant reduction in MSL effort in these committees in 1992/93. Involvement with ISO/REMCO, the Council Committee on Reference Materials was changed from participatory to observatory status in 1991/92.

MSL also carried out the coordination for test work on the compressibility of concrete under the aegis of the Standards Council of Canada. This is ongoing.

Participating in ASTM continued in committees on spectrochemical methods and concrete. The latter will be maintained since it serves as a marketing forum for MSL concrete technology. Continued participation on the committee on spectrochemical methods will be re-examined in 1992/93.

At the Fall meetings of CAC/ISO/TC 102 and 183 (Canadian Advisory Committee for ISO Technical Committee), it was clearly expressed by the industrial participants that they were essentially focused on those standards issues that were of immediate financial concern. They do not see that keeping an eye on longer term trends in standards by attending meetings of the international committees is beneficial. On the other hand, Canadian industry has not yet twitched to the strong marketing that is carried out at these meetings. For example, the Japanese, Australians and Brazilians always send very high level delegates, e.g., the President of Nippon Steel, whereas Canada has been content with "technical" representatives. This may be due to policy being set by the parent companies in the USA!

Question 2: **Is CANMET getting adequate guidance from those responsible for policy formation?**

It seems that the manner in which standards policy is formulated in Canada is very soft. Yet, CANMET or any other organization has the entry point to seek necessary guidance and support, be it through the Standards Council of Canada, Canadian Standards Association, or similar groups.

Question 3: **What is CANMET's responsibility in standards policy formation?**

CANMET has no formal legislative responsibility in setting standards policy. However it has been very pro-active in such policy formation when it set up its non-destructive testing program (MTL) and the certified reference materials program (MSL). Similarly in energy programs, CANMET has formulated standards policy when required to do so. This was prompted by political will or technological capability.

Question 5: **What is CANMET's responsibility in the implementation of standards policy?**

As a federal organization, CANMET is obligated to implement standards policy where applicable.

Question 6: **How does CANMET's investment of resources in the standards area match its mandate? Should we withdraw some resources?**

In MSL, effort on standards is determined by its value to MSL clients. As a Technology Centre, MSL believes that this value is best demonstrated by a level of financial support from the affected client. Proposals to the industrial participants of ISO/TC 102 (Iron Ores) and 183 (Copper, Lead and Zinc Ores and Concentrates) have been made to seek such support; but in general the response has been negative. MSL is therefore reducing and may eventually stop its involvement in these committees. Active participation in the international meetings of ISO/REMCO and ISO/TC 69 (Statistics) was halted in 1991.

Question 7: **How are CANMET's clients participating in the standards process?**

MSL has served as the Canadian representative at international meetings of ISO/REMCO and ISO/TC 69, 102, and 183 in the past when it was the practice of the SCC to subsidize the costs of this participation. This year the subsidy was dropped for all public servants; future participation by MSL is thus unlikely.

Although in many instances, Canadian industry also sent representatives, CANMET had taken the leadership position for the Canadian delegation and it is unknown if industry will, recognize the gap or fill it.

In the technical work of the Canadian ISO committees, industry has always played an important role but has preferred that the committee offices be carried out by MSL for the sake of continuity. It is accurate to say that industry provides the resources required to solve problems of immediate concern but is seldom concerned about those of longer term impact. Still, industrial support has always exceeded that of MSL.

Question 8: **How are standards managed in CANMET? How do we influence policy formation?**

Standards in MSL have always been managed through the project management system. Activities are approved in terms of the MSL mandate. The work undertaken was evaluated in terms of value to MSL clients or to MSL itself. Outputs of the work were defined. The level of resources was controlled at 1.3 PYs in each of the last six years.

MSL impact on standards policy formation is based on technology input to the working committees of ISO or ASTM. For example, MSL worked very hard within ASTM and CSA for these groups to amend their programs to allow for the acceptance of recent MSL advances in concrete technologies. At the international level, MSL played the predominant role in the development of ISO Guides 33 and 35 on the certification and use of reference materials based on experience from the CCRMP. MSL participation in ISO/TC 102 was instrumental in halting a change in the standard sampling procedure for iron ore. If this had been adopted, it was estimated that IOC alone would have had to spend $5M to update its sampling protocol and associated physical facilities.

MSL is represented on the following standards organizations:

* International Organization for Standardization (ISO)
* Standards Council of Canada
* ASTM

Mining Research Laboratories

Three laboratories within MRL have an ongoing involvement with standards-related activities: CEAL, CERL and Elliot Lake. They collectively spend approximately $85 and 1 PY annually in this area. They also generate about $210K annually in related revenue.

The Canadian Explosives Atmospheres Laboratory (CEAL) is the national centre of expertise in the field of testing and assessing products for use in hazardous locations. CEAL has representatives on several Canadian Standards Association (CSA) committees and two Canadian Gas Association (CGA) committees. In addition, CEAL representatives sit on three International Electrochemical Commission (IEC) committees. The standards generated by these committees are all voluntary until they are written into some specific provincial or national legislation. Almost all the certification work undertaken by CEAL results from their involvement in standards. This costs approximately 0.5 PYs and $30K per year and generates at least $100K in related revenue.

The Canadian Explosives Research Laboratory (CERL) benefits from its involvement in standards-related work in a different manner. CERL is and has been involved in the development of international recommendations and conventions that come into effect when written into some specific piece of national legislation. Examples include the United Nations recommendations on the transport of dangerous goods, which now form the basis of Canada's legislation dealing with the transport of dangerous goods. These came out of CERL's representation on the United Nation's Group of Experts on Explosives. CERL is also involved with ICAO on the development of a convention on the marking of explosives. National legislation incorporating this convention is currently being developed in Canada. Although not standards in the normal sense, the outcome is similar.

CERL spends about 0.2 PYs and $15K annually in this area. Over the past two years some $100K annually has been generated in related revenue. This revenue derived from the development of performance packaging and an R&D program on the marking of explosives.

CEAL and CERL are currently seeking accreditation under the Standards Council of Canada as both testing and certification organizations.

MRL's Elliot Lake laboratory acts as the reference laboratory in Canada for the calibration of instruments used in the

measurement and monitoring of airborne radioactive pollutants in mines, mills and other industrial environments, with special interest in thoron/radon and their decay products. It is estimated that Elliot Lake spends about 0.3 PYs and $40K annually on standards-related work. The $10K derived annually from this work is expected to increase to $50K-$80K once the MOU with AECB is signed.

MRL is/has been represented on the following standards organizations:

* Canadian Standards Association (several committees)
* Canadian Gas Association (2 committees)
* International Electrochemical Commission (3 committees)
* Standards Council of Canada
* United Nations Group of Experts on Explosives
* ASTM
* Radon/Thoron test labs in the USA, EEC and Australia
* International Civil Aviation Organization (ICAO)

V-CONCLUSIONS

General

* This study deals with normative standards, not with physical standards. Normative standards are defined by the Standards Council of Canada (SCC) as norms required to solve problems. Standards respond to needs and are normally written by accredited Standards-Writing Organizations (SWO) of the National Standards Systems (NSS).

* The SCC manages the NSS. This includes the accreditation of organizations for standards writing, testing, certification and registration. The SCC is a crown corporation established by an act of Parliament in 1970. It reports to Parliament through the Minister of Consumer and Corporate Affairs.

* By being active on standards-writing committees, government laboratories pursue their technology transfer objectives. In the same fashion, private sector members attempt to promote their commercial interests.

* Within the NSS, the greatest number of standards are written by the CGSB (54 percent) and the CSA (35 percent). CANMET officials are active, as volunteers, on both CGSB and CSA committees. With its recent acquisition of Special Operating Agency (SOA) status, the influence of the CGSB on standards development within the federal government should increase.

* There are many testing organizations within the NSS.

* There are relatively few accredited certification organizations within the NSS. However, there are unaccredited certification organizations whose authority is nevertheless accepted by interested parties. Some of CANMET's laboratories fall into this category. This de facto acceptance of CANMET's authority could change as the evolving requirements of international trade impose more formal requirements.

* As of April 23, 1992 there were no accredited registration organizations within the NSS.

* All departments of the government of Canada are involved in one way or another in standards. OPRA, for example, conducted a study of the NSS and concluded that, in the past, there may have been a breakdown in communication

between the NSS and government regulators. It proposed the development of a new federal policy on standards to resolve these problems. OPRA's recommendations were not favourably received, especially within EMR. Thus, no new policy on standards has been developed.

CANMET

* In total, CANMET commits approximately 16 PYs (two percent of its total staff) to standards-related work. This effort has been estimated to cost an annual total of about $1,300K (about 1.2 percent of CANMET's total budget). If the PY estimate is accurate, the corresponding financial cost may in fact be closer to $2 million than to the $1.3 million estimate indicated here. About half the PYs are dedicated to activities that generate annual revenue in the order of $1 million.

Question 1: **Who is responsible for setting standards policy in Canada?**

The government of Canada sets standards policy and has it implemented through the NSS. Refer to Appendix II for detail.

Question 2: **Is CANMET getting adequate guidance from those responsible for policy formulation?**

Some feel that guidance from the SCC is more effective at operating than at management levels. Most feel that, despite apparent ambiguities, CANMET nevertheless has adequate access to the direction it requires.

Question 3: **What is CANMET's responsibility in standards policy formation?**

CANMET has no legislative responsibility to develop standards policy. However, it participates in the development of standards policy, in its own interests.

Question 4: **What organization is responsible for the implementation of standards policy?**

The Standards Council of Canada (SCC) is responsible for the implementation of standards policy within the NSS.

Question 5: **What is CANMET's responsibility in the implementation of standards policy?**

CANMET must abide by decisions derived within the NSS.

Question 6: **How does CANMET's investment of resources in the standards area match its mandate? Should we withdraw some resources?**

Participation by CANMET officials on standards committees of the NSS supports CANMET's technology transfer strategy. Moreover, the level of this CANMET participation is determined by the financial contribution of the clients affected. On the other hand, some CANMET resources are thinly spread; some reallocation may be necessary.

Question 7: **How are CANMET's clients participating in the standards process?**

Standards committees are staffed by a diverse cross section of volunteers from CANMET's client base.

Question 8: **How are standards managed in CANMET? How do we influence policy formation?**

Standards are managed within each division as a routine element of the technology development process. CANMET can best influence standards policy by working, as at present, within the NSS.

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VI-RECOMMENDATIONS

1. Cooperative standards-writing activities within Canada are necessary elements in any effective technology transfer strategy. Even in the absence of revenue-generating potential, CANMET should continue to dedicate about one-percent of its resources to these activities.

2. At present, CANMET dedicates an additional one-percent of its resources to revenue-generating testing. In this area, CANMET should dedicate whatever resources are required--as long as the related fees reflect market imperatives. That is, CANMET fees should at least recover full costs.

3. Since international standards-related activities are the responsibility of the Standards Council of Canada (SCC), CANMET should restrict its involvement in the international arena to those activities financially supported by the SCC--unless it is in CANMET's direct interest to finance its own participation. Since the SCC appears to be reducing the level of international travel funds heretofore made available to CANMET, CANMET should reduce its related SCC support accordingly.

4. The ultimate responsibility for the management of standards-related activities in CANMET should remain with division directors. However, senior management might wish to reevaluate the scope of CANMET involvement, relative cost recovery practices, as well as relative resource commitments. For example, (1) standards-related activities are unevenly spread across CANMET: ERL appears to have committed the most discretionary resources in this area, EAETB the least; (2) EAETB seems to have committed relatively few resources in this area, despite its apparently heavy participation on industry committees; (3) Cost-recovery fees may not actually cover full costs. For instance, as mentioned in the Conclusion, the actual full costs of providing the services described may be up to 50 percent higher than indicated. This is due to the inclusion of costs that may not be evident to those who set fees.

5. CANMET should open negotiations with the SCC to determine if or how CANMET's various laboratories should apply for official certification or registration status within the NSS. MTL has already applied for certification status for NDT personnel certification. CERL and CEAL are preparing a similar application.

6. CANMET should open separate negotiations with the CGSB to determine if or how the evolving CGSB mandate will affect CANMET's freedom of action in standards-related work.

APPENDIX I

PHYSICAL STANDARDS - NRC

Physical standards include those for mass, length and time. They have been calibrated and certified by the Institute for National Measurement Standards (INMS) of the National Research Council (NRC). They are used as references when determining the accuracy of local standards. In Canada, the development and maintenance of the seven primary standards of physical maintenance are the mandated responsibility of the INMS of the NRC. See Appendix I for additional information on the management of physical standards in Canada.

The INMS derives its authority from the Weights and Measures Act, from the NRC Act as well as from pertinent Orders-in-Council. The Calibration Laboratory Assessment Service (CLAS) was established by the NRC through the INMS in 1988 to form, in cooperation with the Standards Council of Canada (SCC), the Canadian Calibration Network (CCN). The CCN enables manufacturers across Canada to gain easier access to vital calibration services that are traceable to national and international standards. Private or government laboratories wishing to become members of the CCN must be accredited as calibration laboratories by INMS. Compliance with physical standards is, thus, obligatory.

APPENDIX II

STANDARDS COUNCIL OF CANADA (SCC) ACT

According to item 4. (1) of the SCC Act:

The objects of the Council are to foster and promote voluntary standardization in fields relating to the construction, manufacturing, production, quality, performance and safety of buildings, structures, manufactured articles and products and other goods, ------ as a means of advancing the national economy, benefiting the health, safety and welfare of the public, assisting and protecting consumers, facilitating domestic and international trade and furthering international cooperation in relation to standards.

According to item 4. (2) of the SCC Act:

The Council, in carrying out its objects ---- may:

(a) promote cooperation among organizations concerned with voluntary standardization in Canada ----- (b) with a view to achieving compatibility and maximum common usage of standards and codes --- ;

(c) recommend criteria and procedures related to the preparation ----- of voluntary standards in Canada;

(d) accredit ----- organizations in Canada that are engaged in testing and certification ----;
accredit ----- organizations in Canada that are engaged in standards formulation -----;

(e) approve standards ----- submitted by [accredited] organizations as national standards;

(f) provide for the identification and evaluation of the need for new standards -----, and arrange for that need to be satisfied -----;

(g) establish ----- its own standards ------;

(h) ------ represent Canada as the Canadian member of the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC) and any other similar organization engaged in the formulation of voluntary standards;

(k) collect, translate and distribute information on standards and standardization activities ----- in and outside Canada;

(n) make recommendations to the Minister ----- in respect of standards that, in the opinion of the Council, should be made compulsory.

APPENDIX III

SCC STANDARDS AND SPECIFICATIONS

Investigation of Requests for Standardization

Requests are investigated to develop an understanding of the problem, and to see if any other Canadian SWO is doing related work. If no related work is under way, the breadth of Canadian interest in the subject areas is assessed. Also assessed are the project's costs and feasibility.

Planning

Before work proceeds, an estimate is made of the resources required as well as of funding sources. Milestones, are determined and funding support requested from the project's sponsors.

Standards Committees

The effectiveness of standards is enhanced by ensuring that all interested parties have a part in their development. Wide representation is invited, and the number of voting members on the standards committee is not limited. However, it is imperative that balance be maintained among user, producer and general interest categories. In a well balanced committee, the combined votes in any one membership category cannot override the combined votes in two other categories. Committee members are expected to cover their own costs.

Review and Approval of Standards

Draft standards are forwarded to committee members and other interested parties. Changes to the draft are adopted by consensus. This does not necessarily mean unanimity or a majority. All opinions are considered before a consensus decision is sought.

Draft standards approved by the committee are then forwarded to the SWO Review Committee for second-level approval. Second-level reviews ensure that the development of all standards is consistent with accepted policies and procedures. Standards ratified by the SWO Review Committee are then prepared for publication as SWO standards.

Review and Approval of National Standards

National Standards (NS) are developed following the same procedures used for SWO standards - with one exception. The NS must comply with the fifteen criteria for NS development set by the SCC. This review is also carried out by the SWO Review Committee.

APPENDIX IV

EAETB COMMITTEE MEMBERSHIPS

Canadian General Standards Board (CGSB)	
Coordinating Committee on Petroleum	R. Pigeon
Committee on Diesel & Middle Distillate Fuels	R. Pigeon
Committee on Gasoline & Alternative Fuels	R. Pigeon
Committee on Interior Caulk & Sealants	J. Allarie
Committee on Insulated Glazing Units	F. Dubrous
Committee on Mineral Fibre Insulation	F.Szadkowski
Committee on Sealed Glazing Units	F. Dubrous
Committee on Air Tightness Testing	M. Riley
Certification of Air Tightness Testers	M. Riley
Vapour Barrier Materials	M. Riley
Spray Urethane Insulation	F. Szadkowski
Canadian Standards Association (CSA)	
Committee on Energy Evaluation of Houses	M. Riley
Committee on Ventilation in New Houses	F. Szadkowski
Task Group on Combustion Air Provision in Tight Housing	M. Riley
Wood Stove Standards B.415	D. Clarke
Technical Committee on Wind Energy	R. Rangi
Technical Committee on Photovoltaic	J. Royer
Steering Committee on Performance of Electrical Products (SCOPEP)	F. Szadkowski
Technical Committee on Electric Storage Tanks	F. Szadkowski
Technical Committee on Electric Motors	F. Szadkowski
Subcommittee on Fractional Horsepower Motors	F. Szadkowski

APPENDIX IV - Continued

EAETB COMMITTEE MEMBERSHIPS

Canadian Standards Association (CSA)	
Technical Committee on Packaged Air Conditioners & Heat Pumps	F. Szadkowski
Subcommittee on Unitary Heat Pumps	F. Szadkowski
Subcommittee on Room Air Conditioners	F. Szadkowski
Technical Committee on Residential Electric Baseboard Heaters	F. Szadkowski
Technical Committee on Lighting Equipment	F. Szadkowski
Technical Committee on Residential Ventilation Equipment	F. Szadkowski
Technical Committee on Performance of Electrical Appliances	F. Szadkowski
Subcommittee on Household Dishwashers	F. Szadkowski
Subcommittee on Household Refrigerators and Freezers	F. Szadkowski
Subcommittee on Household Clothes Washers and Dryers	F. Szadkowski
Subcommittee on Household Electric Ranges and Ovens	F. Szadkowski
Technical Committee on Performance of Ground and Water Source Heat Pumps	F. Szadkowski
Technical Committee on Ventilated Heat Exchangers	M. Riley
Steering Committee on Energy Conservation in Housing	M. Riley
Ventilation in Housing F326	M. Riley
Subcommittee on Window Labelling A440	Henry/Dubrous
Sizing of Heating Systems	M. Riley
Installation of Solid Fuel Appliances	M. Riley
Energy Labelling of Houses	M. Riley

APPENDIX IV - Continued

EAETB COMMITTEE MEMBERSHIPS

International Energy Agency (IEA)	
Bioenergy Working Group, Task 10	E. Hogan
Canadian Gas Association (CGA)	
Standards Committee on Fuel System Components for Natural Gas Vehicles (NGV) CAN 1 12-3	A. Beregszaszy
Standards Committee NGV Installations Codes/NGV Fuel Systems	A. Beregszaszy
Standards Committee - Propane Installation Code	A. Beregszaszy
Natural Gas Vehicles Development Committee	A. Dolenko
International Standards Organization (ISO) and SCC	
Solar TC180, Chairman	D. McClenahan
International Electro-Technical Committee Photovoltaic	J. Royer
International Electro-Technical Committee Wind Energy	R. Rangi
Canadian Pulp and Paper Association (CPPA)	
Technical Committee - Steam And Power	J. Robert
Technical Committee - Environment Liaison Member	J. Robert
Propane Gas Association of Canada (PGA)	
Committee on Odourants	A. Beregszaszy
Canadian Home Builders Association (CHBA)	
Technical Research Committee	M. Riley

APPENDIX IV - Continued

EAETB COMMITTEE MEMBERSHIPS

Hydrogen Industry Council (HIC)	
Scientific and Research Committee	M. Hammerli
Miscellaneous	
Atlantic Wind Test Technical Advisory Committee	R. Rangi
National Fenestration Rating Council	Henry/Dubrous
Environmental Choice Program	R. Pigeon
ASHRAE Technical Committee 4.5	F. Dubrous
Canadian Electrical Code	J. Royer